Study of some sponges (Porifera, Demospongiae) from the infralitoral of Guarapari, Espírito Santo, Brazil.*

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ABSTRACT

Descriptions are given of specimens of demosponges from the infra-litoral of Guarapari, Espírito Santo, Brazil, a region for which sponges are poorly known. *Erylus formosus* SOLLAS, 1888, *Chondrilla nucula* SCHMIDT, 1852, *Anthosigmella varians* (DUCHASSAING & MICHELOTTI, 1864), *Pseudaxinella lunaecharta* (RIDLEY & DENDY, 1866), *Agelas dispar* DUCHASSAING & MICHELOTTI, 1864, *Mycale fusca* (RIDLEY & DENDY, 1886) and *Aplysina fistularis* forma *fulva* (PALLAS, 1766) are new records for the State of Espírito Santo. *Aaptos aaptos* (SCHMIDT, 1864), *Chondrosia reniformis* NARDO, 1847 and *Darwinella australiensis* CARTER, 1885 are new records for Brazil. Affinities between the lower invertebrate sessil fauna of Guarapari and that of Brazilian tropical and sub-tropical regions are discussed. Chemical data from the literature are reviewed.

RESUMO

São apresentadas descrições de espécimens de demospongias do infralitoral de Guarapari, Espírito Santo, Brasil, região pouco conhecida quanto à sua fauna de poríferos. *Erylus formosus* SOLLAS, 1888, *Chondrilla nucula* SCHMIDT, 1862, *Anthosigmella varians* (DUCHASSAING & MICHELOTTI, 1864), *Pseudaxinella lunaecharta* (RIDLEY & DENDY, 1866), *Agelas dispar* DUCHASSAING & MICHELOTTI, 1864, *Mycale fusca* (RIDLEY & DENDY, 1886), e *Aplysina fistularis* forma *fulva* (PALLAS, 1766) são ocorrências novas para o estado do Espírito Santo. *Aaptos aaptos* (SCHMIDT, 1864), *Chondrosia reniformis* NARDO, 1847 e *Darwinella australiensis* CARTER, 1885 são ocorrências novas para o Brasil. São discutidas as afinidades entre a fauna de invertebrados inferiores sésseis de Guarapari e a das regiões tropical e sub-tropical brasileiras. Resultados químicos da literatura são apresentados.

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INTRODUCTION

Most of the studies of Brazilian sponges has been undertaken with material collected from the coasts of Ceará to Bahia (SOLLAS, 1886, 1888; RIDLEY & DENDY, 1887; BURTON, 1940; LAUBENFELS, 1956; JOHNSON, 1971), a tropical area influenced by the warm waters of the Guianian and Brazilian Currents. South of the Abrolhos archipelago (Bahia) a smaller number of species have yet been described and systematic studies deal principally with sponges obtained off the States of Rio de Janeiro (SELENKA, 1879; PACHECO-COELHO & MELLO-LEITÃO, 1978; OLIVEIRA-PIRES, 1980), São Paulo (LAUBENFELS, 1956; MOTHES-DE-MORAES, 1980) and Rio Grande do Sul (MOTHES-DE-MORAES, 1977, 1978; MOTHES-DE-MORAES & PAULS, 1979; VOLKMER-RIBEIRO et al., 1973; VOLKMER-RIBEIRO & MOTHES-DE-MORAES, 1975).

Studied material has been mostly collected either by hand collecting in intertidal zone (SELENKA, 1879; CARTER, 1890; LAUBENFELS, 1956; PACHECO-COELHO & MELLO-LEITÃO, 1978; MOTHES-DE-MORAES, 1980; OLIVEIRA-PIRES, 1980) or by dragging (SOLLAS, 1886, 1888; RIDLEY & DENDY, 1887; MOTHES-DE-MORAES, 1977, 1978; MOTHES-DE-MORAES & PAULS, 1979; VOLKMER-RIBEIRO et al., 1973; VOLKMER-RIBEIRO & MOTHES-DE-MORAES, 1975). Hence, the bentic fauna between 5 and 15 meters depth remains poorly known. Reports dealing with material collected along the Brazilian tropical and sub-tropical coasts, from the intertidal down to the infralitoral area are those of BOURY-ESNAULT (1973) describing sponges collected by the Calypso ship and of HECHTEL (1976) from the Foster-Laborel collection. These studies pay little attention to the coast of Espírito Santo. The present work contributes to a better knowledge of the sponge fauna from this area.

MATERIAL AND METHODS

Studied sponges are part of the collection obtained in december 1978 during a trip to Três Ilhas (20°36'S-40°23'W) near Guarapari, two miles off the coast. The material was obtained on rocky bottom by Scuba or Narghilé diving between 3 and 12 meters depth. Material was preserved over ethanol (70%).

For spicules preparations, material was selected under binocular stereoscopic microscope, thoroughly washed with tap water and dissociated in a test tube with hot concentrated nitric acid. Spicules free from the sponge tissues were first washed with distilled water, then with ethanol (MOTHES-DE-MORAES, 1977) and subsequently placed on a microscope slide heated until complete evaporation of the solvent and finally mounted with Araldit and kept for 5 minutes at 80-100°C. For scanning electron microscopy, preparations were made by drying spicules on small pieces of microscope slides and coated with gold. Spicules were then observed with a Cambridge Stereoscan Mark II apparatus.

For histologic observations, samples were dehydrated in a graded series of ethanol-water solutions, cleared in xylene and embedded in parafin. Sections obtained with a Ranvier Microtome were stained by the Trichrome Ramon Cajal Technic (BEHMER et al., 1976).

Spicule sizes are given in micrometers as $\bar{x} \pm \bar{s}$ (Y-Z) where $\bar{x}$ is the mean value (n=30), s the standard deviation and Y and Z the minimum and maximum observed values for lenght and width. The terminology used for species description is that of BOROJEVIC et al. (1967). Classification of sponges in orders families is after BERGQUIST (1978) and WIDENMAYER (1977).

SPECIES DESCRIPTIONS

Sub-class TETRACTINOMORPHA LEVI
Order CHORISTIDA SOLLAS
Family GEODIIDAE GRAY

Erylus formosus SOLLAS, 1888

Massive to incrusting sponge (Fig. 1). Outside colour grey to black, inside beige. Smooth surface. Oscules diameter from 1 to 5mm. Ostioles irregularly distributed on the surface, varying from 50 to 100 µm. Choanosome of radiated structure.

Spicules: (Fig. 11-13)

	length	width
Oxeas	761 ± 89 (597-955)	16.4 ± 4.2 (7.5-21.3)
Orthotriaenes		
•Rhabd	504 ± 69 (313-625)	
•Clad	363 ± 50 (250-625)	
Aspidasters	210 ± 26 (171-305)	27.1 ± 9.3 (19.2-48.0)
Centrotylote microxeas	61 ± 8 (45-83)	
Oxyasters	47 ± 10 (27-64)	
Tylasters	12.5 ± 1.7 (8.5-16.0)	

E. formosus has been described by SOLLAS (1888) with material collected along the coast of Bahia, Brazil, during the Challenger expedition. Since then, it has been found in Pernambuco, Brazil, by BOURY-ESNAULT (1973), in Rio Grande do Sul, Brazil, by VOLKMER-RIBEIRO & MOTHES-DE-MORAES (1975) and in the Bahamas area by WIEDENMAYER (1977). This sponge differs from the other ones of the genus principally by the shape of its long and tight aspidasters (SOLLAS, 1888).

Ichtyotoxicity has been claimed for an unidentified *Erylus* species (STEMPIEN et al., 1970).

Sub-class TETRACTINOMORPHA LEVI
Order HADROMERIDA TOPSENT
Family CHONDROSIIDAE SCHULZE

Chondrosia reniformis NARDO, 1847

Massive, cartilaginous sponge (Fig. 2) from white to dark grey in colour. Surface smooth and viscous. Oscules diameter from 2 to 4mm. Ostioles not visible. Ectosome from 1.5 to 2.5mm thick, rich in pigments, containing plenty of spongine-A. Choanosome well delimited (Fig. 21), possessing less spongine-A and pigments, being riddled by canals from 20 to 200 µm wide. Choanocyte chambers 30 µm in size, spread around them. Spicules absent.

This species has been first found in the Adriatic Sea (NARDO, 1847), then in the Mediterranean Sea (TOPSENT, 1895, 1925, 1928), and along the coast of Senegal (LEVI, 1952). The specimen of *Chondrosia* collected by WIEDENMAYER (1977) in the Bahamas might not be of the *reniformis* species (WIEDENMAYER, 1977) as the latter presents a thicker ectosoma (3-10 mm) than that reported for *reniformis* by the other authors (1-2 mm) (TOPSENT, 1928; LEVI, 1952; WIEDENMAYER, 1977) and shows irregular folds on the outer surface, in contrast to *C. reniformis* which is smooth in aspect (WIEDENMAYER, 1977). Whether the *Chondrosia* of WIEDENMAYER should be kept as *C. reniformis* or considered as another species (*C. plebeja*?, WIEDENMAYER, 1977) depends upon the relative importances given to various systematic characteristics of the genus.

Although widely distributed, very few chemical investigations of sponges of the genus *Chondrosia* are available. Antibacterial activity of an unidentified *Chondrosia* species has been associated with the presence of chondrosine (RAVI et al., 1976). The same activity has also been observed for various cyclic peroxydes obtained from *C. collectrix* (SCHMIDT, 1870), together with a series of ethyl esters containing a tetrahydrofurane ring (STIERLE & FAULKNER, 1979).

Chondrilla nucula SCHMIDT, 1862

Sponge outside identical to *Chondrosia reniformis*, having the same size, diameter of oscules and colour pattern (Fig. 3). Ectosome from 0.3 to 1.5 mm thick, possessing pigments. Diameter of the canals from 60 to 200 µm. Choanocyte chambers with a mean diameter of 35 µm (Fig. 26).

Spicules: (Fig. 17)

Oxyspherasters 22.5 ± 4.3 (12.8-29.9)

C. nucula is a cosmopolitan sponge (BOURY-ESNAULT, 1973; WIEDENMAYER, 1977). In Brazil, it has been found by CARTER (1890) in the Fernando de Noronha archipelago, by LAUBENFELS (1956) in Pernambuco and São Paulo, by BOURY-ESNAULT (1973) in Bahia by OLIVEIRA-PIRES (1980) and by the authors (inedited) on the southern coast of Rio de Janeiro. *C. reniformis* and *C. nucula* were always encountered fixed on the dark side of the rocks.

In environmental transplant experiments with Mediterranean sponges, WILKINSON & VACELET (1979) have reported a negative phototactic behaviour for *C. reniformis* and an indifferent one for *C. nucula*. This behaviour has been suggested to be associated with the presence or absence of symbiotic cyanobacteria in the sponge's ectosome (WILKINSON, 1978, 1979). Competition for substrate and/or heavy predation in ecosystems of high diversity, like benthos of the tropical euphotic zone (MARGALEF, 1972; GLYNN, 1973; SARÀ & VACELET, 1973; GREEN, 1977), may be factors conditioning a distribution in iluminated or shaded areas of euryphotic species like *C. nucula*.

C. nucula has been the subject of intense chemical investigation. It has been shown to contain unsaturated fatty acids (LITCHFIELD et al., 1980), stanols (DE ROSA et al., 1973), cerebrosides (SCHMITZ et al, 1974) and the rare chondrillasterol (24-ethyl-cholesta-7,22-dien-3(301) (BERGMANN et al., 1948). Grude extracts of *C. nucula* have been claimed to exert ichtyotoxic (GREEN, 1977), antitumour (BASLOW, 1971; RUGGIERI, 1976) antibacterial (SIGEL et al., 1970) activities. The latter has been associated in an unidentified species of *Chondrilla* with the presence of chondrillin, an unsaturated peroxyketal derived from a fatty acid (WELLS, 1976).

Sub-class T E T R A C T I N O M O R P H A LEVI

Order H A D R O M E R I D A TOPSENT

Family SPIRASTRELLIDAE RIDLEY & DENDY

Anthosigmella varians (DUCHASSAING & MICHELOTTI, 1864)

Massive to incrusting sponge (Fig. 4), fixed on calcareous debris. Outside colour beige to orange, inside grey to beige. Hispid surface. Choanosome cavernous (Fig. 22), containing numerous incrustations at the base. Oscules from 3 to 10 mm in diameter, apparently closed by a contractil membrane. Ostioles not visible.

S p i c u l e s: (Fig. 14-15)

	length	width
Tylostyles	430 ± 69 (281-547)	9.2 ± 1.5 (7.5-12.7)
Anthosigmata	11.8 ± 2.8 (6.3-15.8)	1.5 ± 0.2 (1.1-1.8)

This sponge has been described as *Thalissias varians* by DUCHASSAING & MICHELOTTI (1864) for a Caribbean specimen. It has been found later in Florida, USA (HECHTEL, 1965), Jamaica (LAUBENFELS, 1949) and Puerto Rico (ARNDT, 1927). HECHTEL (1976) reported the species near Recife, Pernambuco, Brazil, without indicating the actual place, depth and nature of the substrate on which it had been found. The authors (inedited) collected samples of that species of both *varians* and *incrustans* forms on the Abrolhos reefs (Bahia, Brazil).

The antitumour activity of *A. varians* has been atributed to several compouds. Among them, only para-hydroxyphenylacetamide has been identified (SCHMITZ et al., 1977). BERGMANN et al. (1950) also isolated clionasterol and poriferasterol from *A. varians*. This species was shown to contain long chain (C_{24} - C_{30}) fatty acids (LITCHFIELD et al., 1976).

Sub-class TETRACTINOMORPHA LEVI

Order HADROMERIDA TOPSENT

Family TETHYIDAE GRAY

Aaptos aaptos (SCHMIDT, 1864)

Massive, hard sponge (Fig. 5). Colour in life yellow, turning dark brown in ethanol or when drying. Hispid surface. Oscules rare, measuring from 2 to 5 mm in diameter. Ostioles not visible. Choanosome cavernous. Skeletal structure radiated (Fig. 29).

Spicules: (Fig. 18)

	length	width
Strongyloxeas	1322 ± 100 (1064-1522)	34.2 ± 8.7 (17.1-46.9)
Styles	319 ± 49 (250-425)	6.0 ± 2.4 (3.0-11.5)

This species has been described under the name *Ancorina aaptos* by SCHMIDT (1864) for an Adriatic sample. It has been found later in the Indian Ocean (LEVI, 1961; VACELET & VASSEUR, 1965; THOMAS, 1973), in the Red Sea (LEVI, 1958), in the Mediterranean Sea (SARÀ & SIRIBELLI, 1960; BOURY-ESNAULT, 1971), along the Atlantic coast of Africa (LEVI, 1959) and in Puerto Rico (WILSON, 1902). The sponge collected by the Calypso off the coast of Pernambuco and identified as *A. aaptos* by BOURY-ESNAULT (1973), presents a spiculation different from that normally found in this species, by having only styles. HECHTEL (1976), working on material collected near Bahia, identified *A. bergmani* LAUBENFELS, 1936, a sponge whose characters are similar to those described for *A. aaptos sensu* BOURY-ESNAULT (1973), which is now synonimous of the former (HECHTEL, 1976).

Up to now, *A. aaptos* escape to any chemical investigation. *A. papilata* was reported to produce an agglutinine-like compound (ROGERS, 1977). The sterols of an unidentified *Aaptos* species have been studied by BERGMANN et al. (1950), but only cholesterol was identified.

Sub-class TETRACTINOMORPHA LEVI

Order AXINELLIDA BERGQUIST

Family AXINELLIDAE RIDLEY & DENDY

Pseudaxinella lunaecharta (RIDLEY & DENDY, 1866)

Massive, friable sponge. Colour in life red-orange, turning beige in ethanol. Surface presenting numerous groves which are characteristic of the species (RIDLEY & DENDY, 1887) (Fig. 9). Oscules measuring from 2 to 3 mm in diameter. Ostioles not observed. Ectosome not differenciated. Skeletal structure plumose, without formation of axial condensation (Fig. 24). Spicules entirely or partly included in large amounts of spongine B.

Spicules: (Fig. 19)

	length	width
Oxeas	281 ± 31 (203-328)	12.7 ± 2.1 (9.6-17.5)
Styles	202 ± 23 (156-242)	12.0 ± 1.5 (10.7-16.6)

Pseudaxinella lunaecharta has been described as *Axinella lunaecharta* by RIDLEY & DENDY with material collected by the Challenger expedition in the Cabo Verde islands (RIDLEY & DENDY, 1887). It has been found by LAUBENFELS (1949) and WIEDENMAYER (1977) in the Bahamas and by LEVI (1961) in the Gulf of Guinea. In Brazil it has been reported near Recife by HECHTEL (1976) under the name *Axinella lunaecharta*.

The work of BERGMANN (1949) describing the identification of sterols in *P. rosacea* seems to be the only on a sponge of the genus *Pseudaxinella*. Current confusion between the genera *Pseudaxinella* and *Axinella* may invalid this assumption.

Sub-cass TETRACTINOMORPHA LEVI

Order AXINELLIDA BERGQUIST

Family AGELASIDAE VERRIL

Agelas dispar DUCHASSAING & MICHELOTTI, 1864

Bulbous sponge. Colour dark brown in life as well as in ethanol. Groves can be seen on the surface of the sponge which is characteristic of the species (DUCHASSAING & MICHELOTTI, 1864) (Fig. 7).

Skeleton plumose (Fig. 27), without axial condensation, having ascendent fibers of spongine-B echinated by acanthostyles having from 9 to 17 whorls of spines.

Spicules: (Fig. 20)

	length	width
Acanthostyles	167 ± 22 (128-188)	11.3 ± 2.1 (8.5-18.1)

Agelas dispar is a tropical western Atlantic sponge (DUCHASSAING & MICHELOTTI, 1864; LAUBENFELS, 1936; WIEDENMAYER, 1977), reported by BOURY-ESNAULT (1973) and HECHTEL (1976) for Brazil near Pernambuco, Bahia and Fernando de Noronha.

The sponges of the genus *Agelas* have been intensively studied. An unidentified species has been claimed to show antibiotic activity (BURKHOLDER, 1973), associated with the presence of two dihydroxyindole derivatives (STEMPIEN, 1966). Extracts of *A. sparsus* GRAY, 1867 and *A. dilatata have* been found antibiotic (HASHIMOTO, 1979) and ichtyoxic (GREEN, 1977). New pigments (BUCHECKER et al., 1977, TANAKA et al., 1978) have been obtained from respectively *A. schmidtii* WILSON, 1902 and *A. mauritiana*. Sterols (BALLANTINE et al., 1979) of *A. mauritiana* and *A. oroides* TOPSENT, 1920 are saturated or present a double bond in the Δ^7 position. *A. oroides* has been found to be a rich source of various bromopyrole derivatives (FAULKNER & ANDERSEN, 1974). Among them, oroidin is characteristic in having a guanidine in addition to the bromopyrole nucleus (BAKER & MURPHY, 1976).

Sub-class CERACTINOMORPHA LEVI

Order POECILOSCLERIDA TOPSENT

Family MYCALIDAE LUNDBECK

Mycale fusca (RIDLEY & DENDY, 1886)

Massive sponge (Fig. 8). Colour in life brown, turning beige in ethanol. Smooth surface, incrustated by sediments and algae. Oscules and ostioles not visibles in the studied specimens. Choanocyte chambers having a diameter of 20 to 30 µm. Ectosome easily detachable. Choanosome cavernous and friable. Skeleton plumoreticulated with numerous anisochela rosettes under the ectosome (Fig. 23).

Spicules: (Fig. 16)

	length	width
Tilostyles	609 ± 81 (373-731)	14.0 ± 1.8 (10.7-17.7)
Anisochelae	56.3 ± 3.8 (44.4-61.8)	
Sigmata	35.0 ± 3.1 (29.4-42.6)	
Raphides		

RIDLEY & DENDY (1887) registered *Esperella fusca* for the shallow water coastal region of Bahia. Since then, this sponge has not been found anymore and may be considered endemic for Brazil (HECHTEL, 1976). No chemical work has been reported for *M. fusca*, but other species of the genus showed acute toxicity (*M. lingua* and *Mycale* sp.) (GREEN, 1977) and antitumor activity (*M. microsigmatosa*) (BASLOW, 1969). Free histamine (METTRICK et al., 1965) has been isolated from *M. laevis*

Sub-class C E R A C T I N O M O R P H A LEVI

Order D E N D R O C E R A T I D A MINCHIN

Family APLYSILLIDAE VOSMAER

Darwinella australiensis CARTER, 1885

Carmine red massive sponge. Surface covered with conules (Fig. 6). Oscules located along the upper parts of the sponge, 4 to 6 mm large in diameter. Ostioles (± 100 μm) in groups of 3 to 6 on the vestibular cavities. Skelton dendritic in the external parts, having some anastomoses in the inner ones. Stratified fibers, measuring from 100 to 180 μm in diameter, showing some incrustations. Choanocyte chambers oval, the larger diameter measuring from 40 to 120 μm. Triactinic spiculoid formations abundant, having radia of 800 ± 85 μm (Fig. 25). Tetractinic ones rare, with radia of 455 ± 70 μm. Studied specimens did contain eggs and embryos.

D. australiensis is a common sponge of the Indian Ocean and of the Mediterranean Sea (CARTER, 1885; TOPSENT, 1892; BOURY-ESNAULT, 1971; PRONZATO, 1975). It has been found as well in the Atlantic Ocean near Senegal by LEVI (1952) and in the Bermudas by LAUBENFELS (1950). Another species of the genus, *D. mulleri* has been described by SCHULTZE (1865) with material collected in Brazil.

Due to the presence of some incrustations in the fibers and of anastomoses in the central parts, the specimens studied are quite similar to *Igernella joyeuxi* (TOPSENT, 1889) cited by BOURY-ESNAULT (1973) for the region of Recife, Brazil. The two species differ in colour, in the predominantly dendritic character of the fibers and in the presen-

ce of a larger quantity of triactinic spiculoids in *D. australiensis* (LAUBENFELS, 1948; PRONZATO, 1975).

No chemical work has been reported for the genus *Darwinella.*

Sub-class C E R A C T I N O M O R P H A LEVI

Order D I C T Y O C E R A T I D A (?) MINCHIN

Family SPONGIIDAE (?) GRAY

Aplysina fistularis forma *fulva* (PALLAS, 1766)

Massive to digitated sponge. Diameter of the branches from 10 to 40mm (Fig. 10). Colour in life greenish-yellow turning rapidly brown when exposed to air. Surface presenting conules 0.5 to 2,0 mm high. Oscules diameter from 1.0 to 5.0mm. Skeleton composed of a reticulation of golden pithed fibers 100 to 200 µm in diameter (Fig. 28). Spherical choanocyte chambers 39,2 ± 2,1 µm in diameter.

The species of the genus *Aplysina* NARDO, 1834 are frequently named by its synonimous genus *Verongia* BOWERBANK, 1845 (WIEDENMAYER, 1977). VACELET (1959) gave priority to the name *Verongia* owing to the poor existing description in the earliest publication on *Aplysina.* However, according to the International Code of Zoological Nomenclature (1961) the name *Aplysina* is available (art. 11 and 12) and valid because endowed of a description (art. 50) and a type-species (art. 67-g and 69-a (ii-2)). Furthemore, *Aplysina* is the first name given to the taxon (art. 23) (WIEDENMAYER, 1977).

Placing the genus *Aplysina* in the family SPONGIIDAE Gray, WIEDENMAYER (1977) did not take into account neither their oviparity (GALLISSIAN, 1976), nor their complex histologic structure (BERGQUIST, 1978). Finally, the presence of both specific amino-acid patterns (BERGQUIST & HOGG, 1969); BERGQUIST & HARTMANN, 1969) and unique dibromotyrosine derivatives (CIMINO et al., 1975; KELECOM & KANNENGIESSER, 1979) are characters favoring the classification of this genus (together with others such as *Ianthella* GRAY, 1869 and *Smenospongia* WIEDENMAYER, 1977) in a different order (GALISSIAN, 1976; BERGQUIST, 1978, 1980; VAN SOEST, 1978).

A. fistularis forma *fulva* has been described as *Spongia fulva* by PALLAS for the Atlantic Ocean (WIEDENMAYER, 1977). Based on the list of synonims given by WIEDENMAYER (1977), it can be considered as a tropical cosmopolitan species (DUCHASSAING DE FOMBRESSIM & MICHELOTTI, 1864; LAUBENFELS, 1936, 1948, 1956; WIEDENMAYER, 1977). In Brazil it has been reported in Ceará (LAUBENFELS, 1956; JOHNSON, 1971), Pernambuco (JOHNSON,

1971; BOURY-ESNAULT, 1973; HECHTEL, 1976) and Bahia (BOURY-ESNAULT, 1973; HECHTEL, 1976).

A. *fistularis* forma *fulva* has been shown to contain several di-tetra- and hexa-bromotyrosine related metabolites which have been found responsible for the cytotoxic activity of the sponge (GOPICHAND & SCHMITZ, 1979). Antibacterial (SHARMA & BURKHOLDER, 1967) and antitumour (BASLOW, 1969) activities have been claimed for two other tyrosine derived bromo-compouds isolated from *A. fistularis* (in text *Verongia fistularis*). This sponge also contains aplysterol and 24,28-didehydroaplysterol, two peculiar C-27 methyl-sterols only found in sponges of the genus *Aplysina* (DE ROSA et al., 1973). Many other species of the genus *Aplysina* have been investigated affording aeroplysin-1 (FATTORUSSO et al., 1972) and aeroplysin-2 (MINALE et al., 1972), aerothionine and homo-aerothionine (MOODY et al., 1972), astaxanthin (TANAKA et al., 1978), 3,4-dihydroxyquinoline-2-carboxylic acid (FATTORUSSO et al., 1971), 25-dehydroaplysterol, verongulasterol, 24R and 24S isopropenyl-cholesterol (KOKKE et al., 1979) and aplysinopsin (HOLLENBEAK & SCHMITZ, 1977). The latter compound exerts antineoplastic activity (HOLLENBEAK & SCHMITZ, 1977).

DISCUSSION

Little affinity has been found between tropical and sub-tropical sponges. More than 220 species have been collected along the Brazilian coast, but only 8 in both areas. From the 10 sponges of Guarapari identified in this work, three are new occurrence for Brazil and six were already known for the Bahian and Northeastern coasts. The region of Guarapari seems thus to posses a tropical-type sponge fauna.

The lack of information about the sponge fauna of Cabo Frio (Rio de Janeiro) does not allow comparisons with the one of Guarapari. However, preliminary observations suggest more affinities with the fauna of the São Paulo coast (sub-tropical), as happens with madreporians and gorgonians (BAYER, 1961; LABOREL, 1967). Thus the southern limit for sponges of the Brazilian tropical area can be placed somowhere between Guarapari and Cabo Frio, as it has been suggested by HECHTEL (1976), and may be determined by the upwelling of colder waters in Cabo Frio, which may act directly, on the sponges of narrow limits of thermic tolerance, or indirectly, by limiting the establishment of other organisms such as corals, which would offer a more diversified environment (i.e. a bigger number of niches) to be occuped by the sponges.

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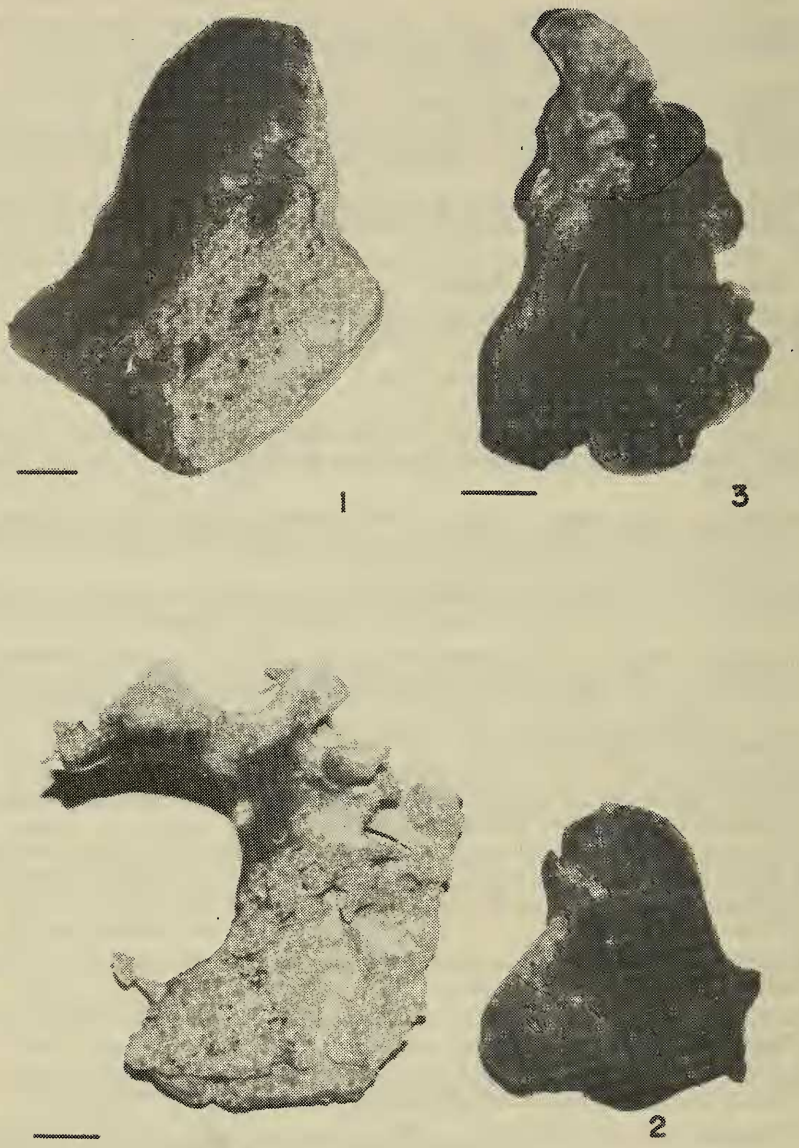

Fig. 1-3: 1. *Erylus formosus*; 2. *Chondrosia reniformis*; 3. *Chondrilla nucula*. (Scale bar =1cm)

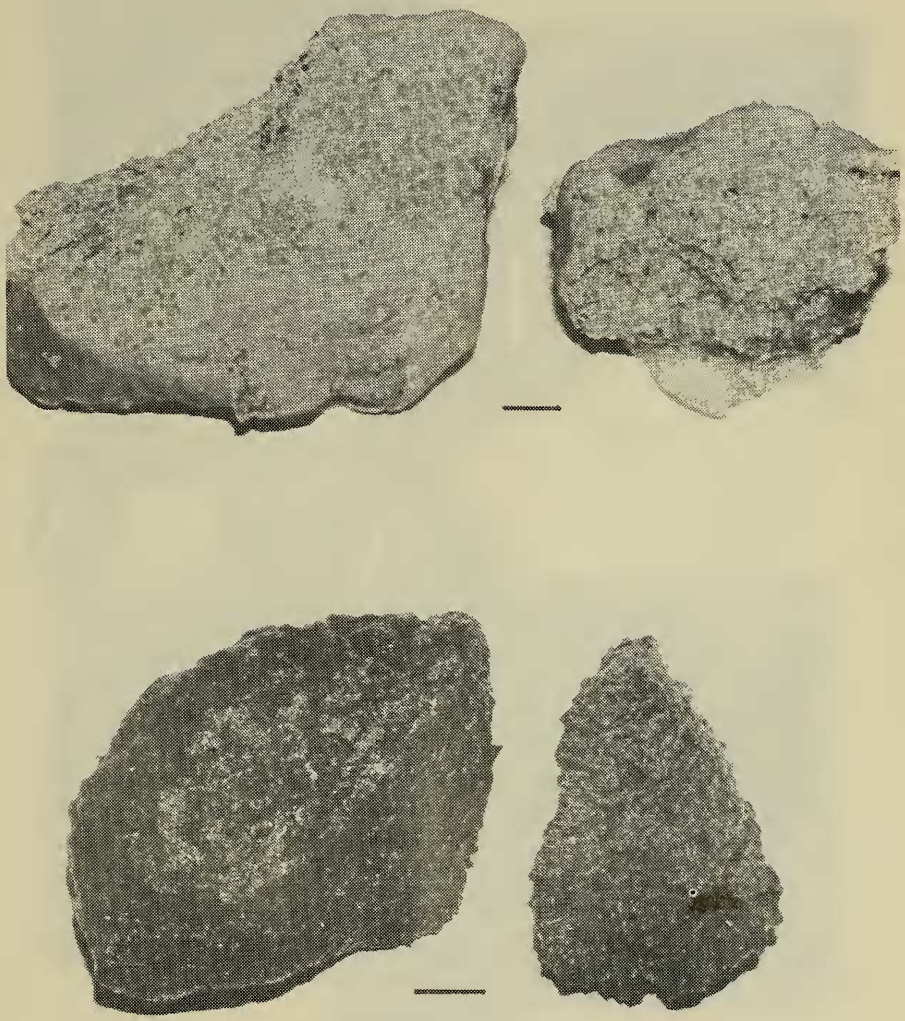

Fig. 4-5: 4. *Anthosigmella varians*; 5. *Asptos aaptos*. (Scale bar = 1cm).

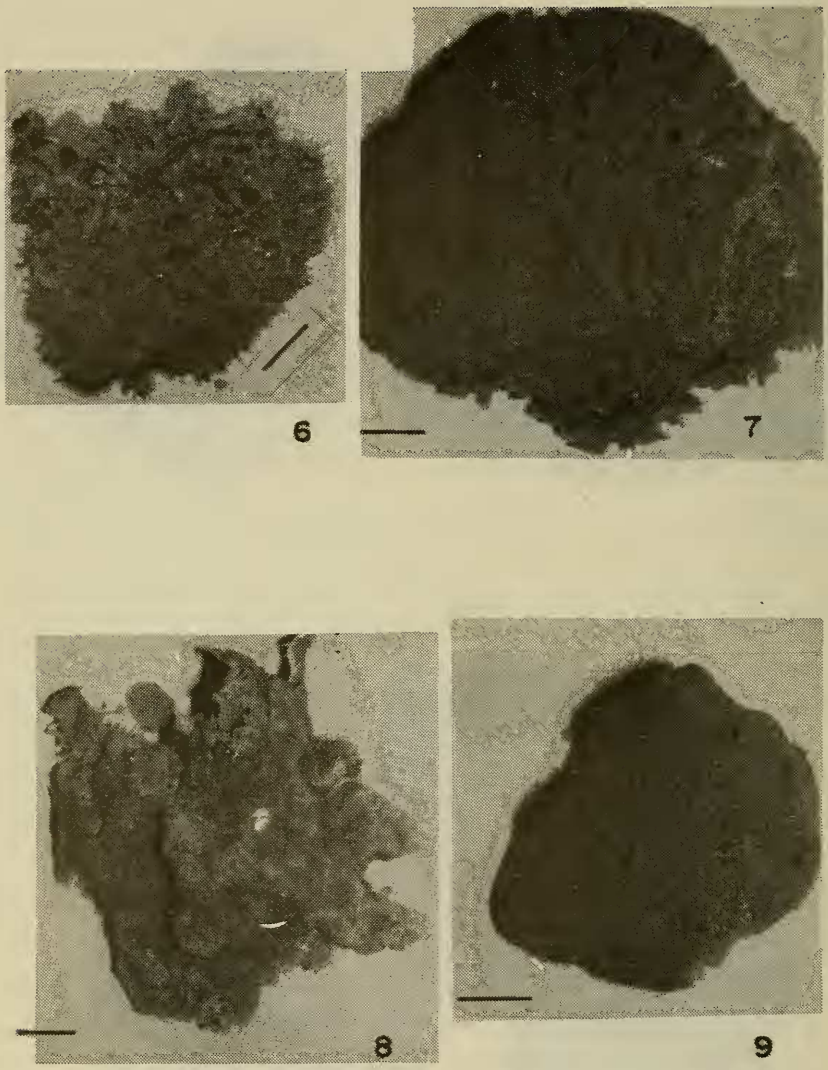

Fig. 6-9: 6. *Darwinella australiensis*; 7. *Agelas dispar*; 8. *Mycale fusca*; 9. *Pseudaxinella lunaecharta*. (Scale bar = 1cm).

Fig. 10: *Aplysina fistularis* forma *fulva*. (Scale bar = 1cm).

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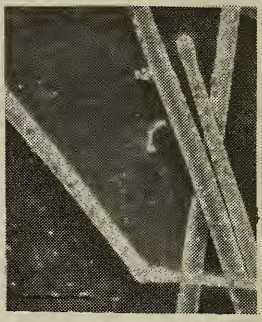

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Fig. 11-16: Scanning electron micrographs. 11-13. *Erylus formosus*; 11. Aspidaster (90,91); 12. Oxygaster (9,09); 13. Tylaster (3,64); 14-15. *Anthosigmella varians:* 14. Tylostyles and anthosigma (42,11); 15. Magnified view of the anthosigma (10,53); 16. *Mycale fusca*, general view of the spicules (44,44). (The number in parenthesis is the value, in micrometers, of the Scale bar).

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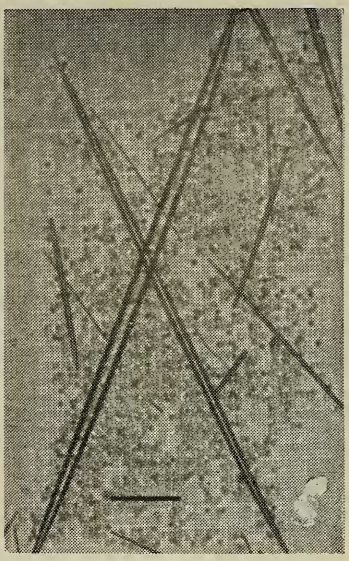

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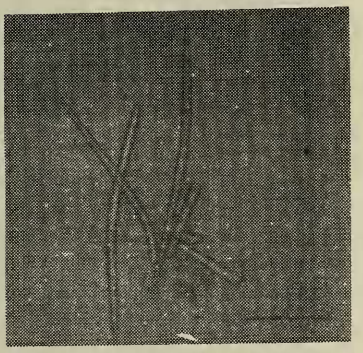

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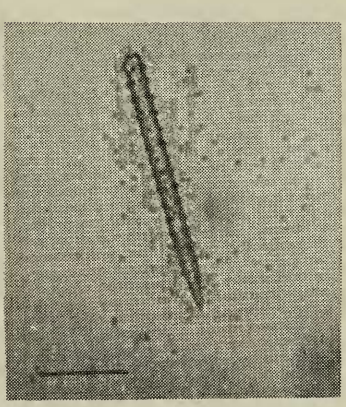

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Fig. 17-20: Microphotographies of some spicules. 17. *Chondrilla nucula*: oxyspheraster; 18. *Aaptos aaptos*: styles and strongyloxeas; 19. *Pseudaxinella lunaecharta*: styles and oxea; 20. *Agelas dispar*: acanthostyle (Scale bar=100µm (Fig. 17, 19, 20) and 200 µm (Fig. 18)).

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Fig. 21-24: Histologic sections of the sponges. 21. *Chondrosia reniformis*; 22. *Anthosigmella varians*; 23. *Mycale fusca* (note the anisochela rosette); 24. *Pseudaxinella lunaecharta*. (Scale bar=200 µm (Fig. 21) and 100 µm (Fig. 22, 23, 24)).

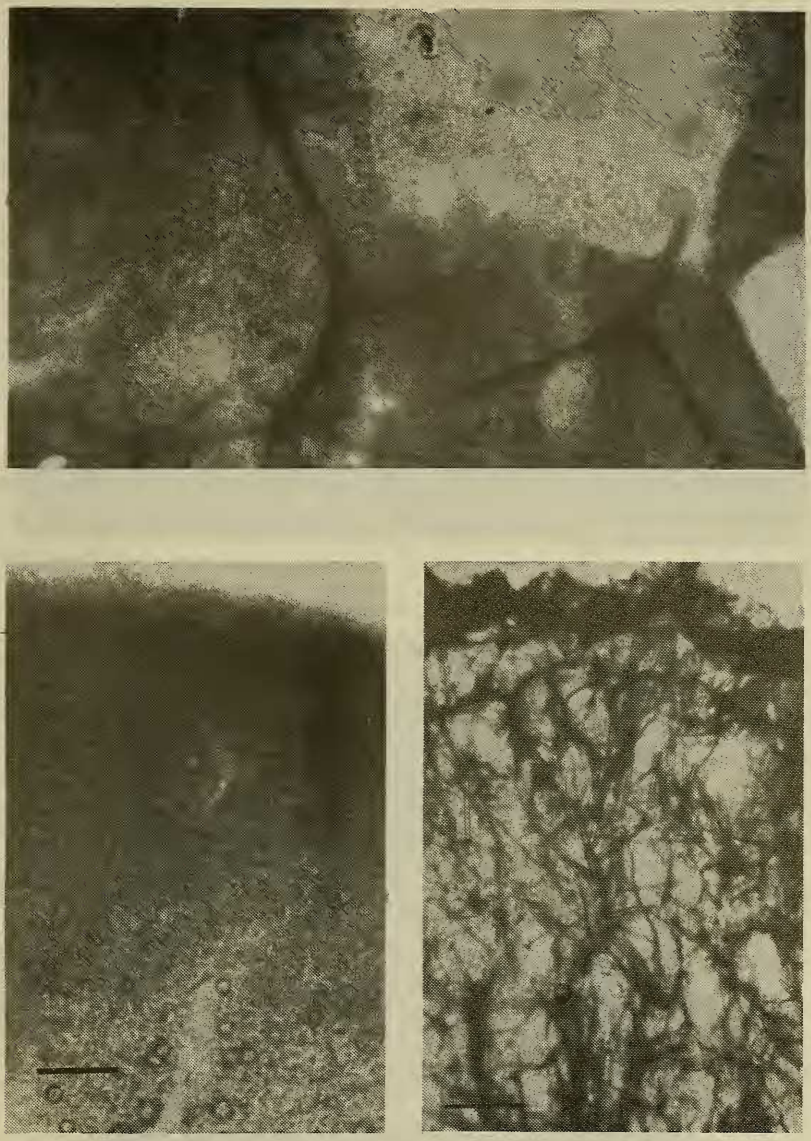
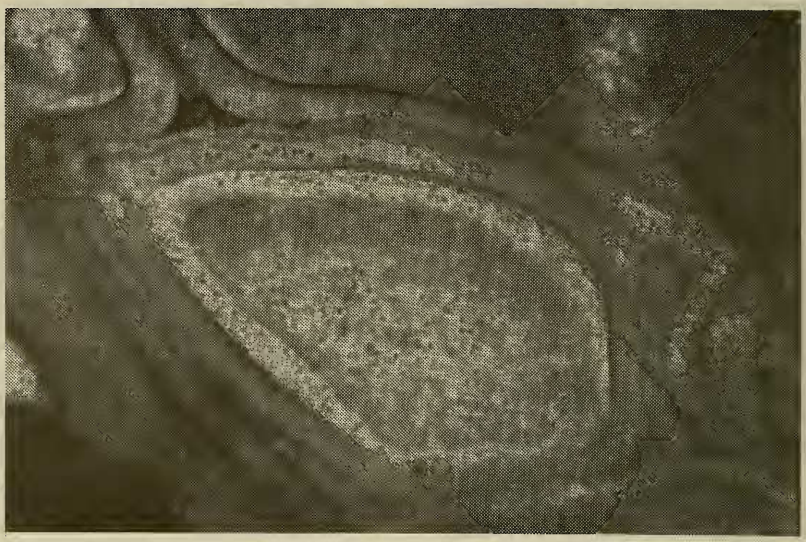


Fig. 25-27: Histologic sections of the sponges. 25. *Darwinella australiensis*; 26. *Chondrilla nucula*; 27. *Agelas dispar*. (Scale bar=100 µm (Fig. 25) and 200 µm (Fig. 26, 27)).



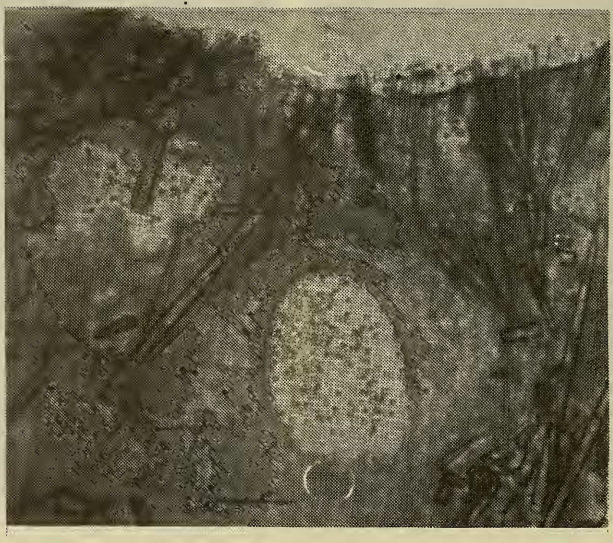


Fig. 28-29: Histologic sections of the sponges. 28. *Aplysina fistularis* forma *fulva*; 29. *Aaptos aaptos* (Scale bar = 100 µm (Fig. 28) and 200 µm (Fig. 29)).